Express Terms

and

Purpose and Rationale Statement

for Work Group 9:M Occupancies

Table 601

EXPRESS TERMS

TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (hours)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV[d]	TYPE V	
	A	B	A[e]	B	A[e]	B	HT	A[e]	B
Structural frame[a]	3	2	1	0	1	0	HT	1	0
Bearing walls Exterior[g] Interior	 4b 3	 4b 2	 1 1	 0 0	 4b 1	 4b 0	 4b 1/HT	 1 1	 0 0
Nonbearing walls and partitions Exterior	See Table 602								
Nonbearing walls and partitions Interior[f]	0	0	0	0	0	0	See Section 602.4.6	0	0
Floor construction Including supporting beams and joists	2	2	1	0	1	0	HT	1	0
Roof construction Including supporting beams and joists	2[c]	1[c]	1[c]	0[c]	1[c]	0	HT	1[c]	0

For SI: 1 foot = 304.8 mm.

a. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns and bracing members designed to carry gravity loads. The members of floor or roof panels which have no connection to the columns shall be considered secondary members and not a part of the structural frame.

b For building classified as Group B, F, M, S, or R occupancies, where the fire separation distance is 5 feet (1.6 m) or more, the minimum fire resistance rating of the exterior bearing walls shall be permitted to be 2 hours.

c. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire retardant treated wood members shall be allowed to be used for such unprotected members.

d. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.

e. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.

f. Not less than the fire-resistance rating required by other sections of this code.

g. Not less than the fire-resistance rating based on fire separation distance (see Table 602).

PURPOSE AND RATIONALE STATEMENT

(SFM) The purpose of the proposed amendments to Table 601 is to reasonably maintain the current level of fire/life safety provided by the CBC by accomplishing the following:

1. Increase the minimum fire-resistance ratings required for exterior bearing walls in buildings of Types I, III, and IV construction to 4 hours where the fire separation distance is less than 5 feet for all occupancies and for buildings classified as Group A, E, H, or I Occupancies regardless of the fire separation distance.
2. Eliminate the allowance that permits a 1-hour reduction in the required fire-resistance ratings of the structural frame and bearing walls where supporting a roof only in Types IA and IB construction.
3. Eliminate the provisions that allow for the substitution of fire-retardant-treated wood for the roof structural elements and other elements of the roof construction in buildings of Types I and II construction (which would otherwise be required to be noncombustible) when the following conditions are met:
    a. The building is two stories or less in height,
    b. The building is of Type II construction and is greater than two stories in height, or
    c. The building is of Type I construction and is greater than two stories in height and the vertical distance from the upper floor to the underside of the roof deck is at least 20 feet.

The 2006 International Building Code (IBC) requires exterior bearing walls in Types I, II, and III construction to have significantly lesser degrees of fire resistance than required in the California Building Code (CBC). Although it is difficult to make a direct comparison between the IBC and the CBC regarding the fire resistive requirements for exterior bearing walls because of the differences in the occupancy classifications and the fact that the CBC bases the requirements on occupancy, whereas the IBC does not, it becomes readily evident after a reasonably detailed evaluation that the ratings are significantly reduced. Generally speaking, the IBC only requires 2-hour fire resistive ratings for all the types of construction mentioned above except Type IA which specifies a minimum 3-hour fire resistance rating. In comparison, the CBC requires those exterior bearing walls to have a minimum 4-hour fire resistance rating.

These amendments will require those types of construction to have a higher fire resistance rating consistent with the concept of the higher fire resistance ratings for exterior walls in Table 5-A of the CBC. Exterior walls in Types I, III and IV construction have traditionally been required to have these higher fire resistance ratings by the CBC.

By allowing the structural frame, including columns and bearing walls, to be reduced by one hour for Types IA (CBC Type I-F.R.) and IB (CBC Type II-F.R.) construction, for one-story buildings, the actual construction type, in effect, becomes Types IB and IIA (CBC Type II-1 hour) respectively. Allowing the one-hour reduction is contrary to the concept of the structural frame which is intended to provide overall structural integrity to the building. This is accomplished through adequate fire resistive protection of the main bearing elements and the framing members that connect directly into the main bearing elements in order to form a complete building structural envelope which will withstand the duration of fire to which it may be exposed based on the required fire resistance rating. The structural integrity of the building as a whole should be maintained during fire exposure conditions in order to prevent total collapse and should be provided regardless of building height or number of stories. This also provides additional safety for fire fighters that may have to go onto the roof to conduct fire fighting activities or ventilate the building.

Also, allowing the 1-hour reduction for a Type IB building, in effect, results in a Type IIA building of unlimited area. This is a very liberal allowance in the IBC which is inconsistent with the concepts of Table 601 and Table 503.

Presently, the CBC does not contain a similar provision to Footnote b to Table 601 of the IBC. The closest the CBC comes to this reduction is found in Section 508 which allows a one-hour reduction for the structural elements in buildings of Type II One-hour construction when such buildings are protected throughout with an approved automatic sprinkler system, when the system is not required by any other provisions of the code. It should be noted that such a reduction is presently permitted in the IBC without having to provide an automatic sprinkler system throughout the building. It should also be noted that Footnote d to IBC Table 601 provides the comparable one-hour reduction in the fire resistance ratings to that allowed by Section 508 of the UBC when automatic sprinklers are provided. So the trade-off is not lost with the deletion of Footnote b.

There is no technical supporting documentation to substantiate such a reduction in fire resistance for the structural elements supporting roofs in unsprinklered Type I construction buildings. We are especially concerned about the structural frame that ties the building together, and as such, is an integral structural unit under fire conditions. The basic requirement is that all portions of the entire structural frame need to have the same fire resistance rating in order for the building to maintain its overall structural integrity during a severe fire exposure. That is why there is a single line entry in Table 601 for the structural frame. Reducing the fire resistance of portions of the structural frame that supports the roof of a building will weaken the overall fire performance of the building by subjecting it to the possibility of premature structural collapse.

These proposed revisions more closely align the IBC with the 1997 UBC for the allowable reductions in the required fire resistance ratings for structural members supporting roofs. The reduction in roof ratings is an especially important issue to the local fire departments which must often access the roof for fire fighting purposes as well

as to ventilate the building. Reducing the fire resistive protection for the roof structural elements beyond that presently allowed by the CBC would pose an additional risk to the fire fighters attacking fires in these potentially large buildings. Furthermore, roof construction in buildings required to be of noncombustible construction should not be allowed to have combustible elements, even if they are fire-retardant-treated wood, since they will still burn when exposed directly to fire. This can pose a similar risk to the local fire department by resulting in a premature failure of the roof construction during a fire. The allowable use of fire-retardant-treated wood in the roof construction would also add considerably more fire load to an otherwise noncombustible building.